RFIDEAS

Ethernet 241™

Configuration Utility
User Manual

99009130 P

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The reader may not recognize value cards in the presence of high RF fields. If the current reading is erratic, the user shall take the following step: Move the equipment from any known transmitters nearby. For more information contact Tech Support at 866.439.4884.

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The Basics

1

Overview

Product Description

The Ethernet 241™ is a 2-port Ethernet switch that includes a serial port. The Ethernet 241 is meant to connect between a network printer and its network with the serial port attaching to an RF IDeas pcProx® reader.

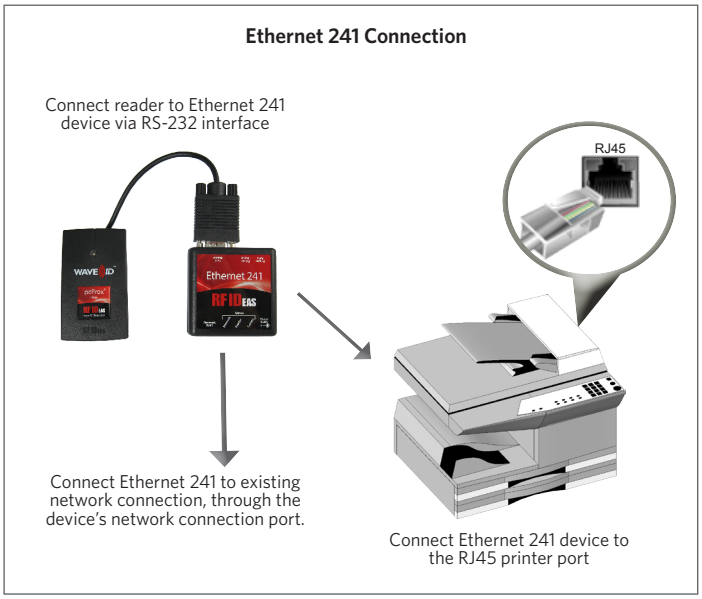
The Ethernet 241 will forward Ethernet packets between its 2 ports and provide a TCP tunnel to the serial port. The tunnel provides the means for badge reader data to be read by a remote computer, which will use badge information to control dispatching jobs to the printer.

Device Features

The Ethernet 241 features include:

- IP address may be statically assigned or obtained via DHCP
- 2-port Ethernet software switch
- Each Ethernet port may be configured to link modes: auto-negotiate, 100 Mbps full-duplex, 10 Mbps full-duplex, or 10 Mbps half-duplex
- TCP tunnel to serial port
- Discovery protocol provides means for finding all Ethernet 241 devices on a network
- Command line interface via serial port or Telnet for management and configuration
- Dual-purpose button to invoke the command line or to reset configuration.
- Automatic backup copies of configuration data and software
- Client (push data to a server asynchronously) or Server (polled) modes.

Figure 1 - Connection Setup


Ethernet 241 Connection
Connect reader to Ethernet 241 device via RS-232 interface
RJ45
Ethernet 241
Connect Ethernet 241 to existing network connection, through the device's network connection port.
Connect Ethernet 241 device to the RJ45 printer port

Operation 2

Device Operations

Switch Operation

The Ethernet 241 will inspect packets received at the network-facing port. Based on the destination IP address and TCP or UDP port number, the Ethernet 241 will decide if a packet is to be forwarded to the printer or if it is to be passed to the Ethernet 241's internal network stack for processing. The Ethernet 241 will process ARP requests for its IP address, UDP packets directed at the Discovery port, DHCP packets, TCP packets directed at the tunnel port, and TCP packets directed at the Telnet port. In some cases such as ARP, a packet will be passed to the printer port and also copied to the Ethernet 241 network stack.

Serial Port Operation

By default the serial port is available for tunneling between the badge reader and a TCP connection. When the button is pressed, the serial port is placed into command line mode, forcing a tunnel connection to close if one is active. If a valid command is not entered within 30 seconds after the command line is activated on the serial port, the command line should be closed, once again making the serial available for tunneling.

Serial Tunnel Operation

A serial tunnel will be established when a remote computer initiates a TCP connection to the Ethernet 241's tunnel port. When the tunnel is active, the Ethernet 241 will forward data between the serial port and the remote computer.

If the button on the Ethernet 241 is pressed to enable the command on the serial port and there is a serial tunnel active, the tunnel will be forced closed and the command prompt will be presented on the serial interface.

Telnet Operation

The Ethernet 241 provides a Telnet server. When a remote client connects to the server, it will provide a command line interface, through which configuration settings may be inspected and changed. An optional password may be applied to the Telnet interface.

When the Telnet connection is established, the server will first prompt whether or not echoing of characters is to be enabled:

```
RF IDeas Ethernet 241, enable echo [Y|N]>
```

Once that prompt is answered, if there is a password set, the next prompt will be for the password:

```
Password>
```

Otherwise the command prompt will be presented.

Configuration 3

Device Configuration

The behavior of the Ethernet 241 is controlled by several configurable parameters that may be viewed and changed via the command line (see the 'set' and 'show' commands). Each parameter is referenced by name. Parameter names, valid values, and factory default values are listed in Table 2 (pg. 10-11). Changes to parameters will take effect on the next reboot of the Ethernet 241.

Parameters are stored in serial flash. A backup copy of the most recent valid set of parameters is kept in a separate area. In case the primary parameter store becomes corrupted, the contents of the backup will be copied over the primary storage area.

If DHCP is not active on your network, programming can be achieved by connecting a Serial null modem cable to the RS-232 port on the Ethernet 241 Device.

Note: Serial null modem cables are available as an accessory from RF IDeas or installer supplied.
Available cable type: DB9 Female to DB9 Female Null Modem Cable

Operation Modes

The 241 will operate in one of two user selectable modes: client and server.

Server Configuration Mode

In server configuration, card data must be polled asynchronously by a host.

Client Configuration Mode

In client mode, when card data is received from the reader, the 241 connects to a specified host and sends a URL with user specified information that can include the card data, the reader LUID, the 241 MAC and IP address.

serv_client = on or off

Note: on is the default

After power-on, network discovery and network configuration, the 241 may request a reader configuration string for a user defined server port at a user-defined URL or IP address. If an IP address is specified and not the default, it will be used, otherwise the URL will be used.

The Query String is the part of the URL that contains data to be passed to a web application. The response time from receiving the card data string from the reader to the server connection and data transmission will be less than 50ms.

When a server data URL is specified and a card has been read by the reader, the 241 will format a URL string appending the user specified Server Data URL and Server Data Str with a parameter string that may contain the card id, the 241 MAC address, 241 IP address, the reader LUID and/or 16-bit sequence number.

All URL parameters will expand the strings $1 through $7 stripping CR and/or LF characters.

Parameters and expansion rules are as follows:

Table 1 - URL Parameters

URL Parameter	Expands to
$1	The card ID from the reader from 1 to 32 hexadecimal characters in length (leading spaces stripped)
$2	The 241 Network port MAC address as 12 lower case hexadecimal digits
$3	The 4 digit hex LUID as read from the reader by the 241 after power-up and initialization
$4	A 16-bit sequence number initialized to 0 on start-up and incremented on each successful server connect
$5	The IP Address of the 241
$6	The attached device port MAC address as 12 lower case hexadecimal digits
$7	The IP Address of the device attached to the device port

Parameter Example:

data_serv_url = http://www.serverName.com
data_str = /url/path/?cardid=$1&mac=$2&luid=$3&seq=$4&ip=$5&devmac=$6&devip=$7

http://www.serverName.com/url/path/?cardid=$1&mac=$2&luid=$3&seq=$4&ip=$5&devmac=$6&devip=$7

In response to the 241 card data written to the server, the server will acknowledge receipt of the card data. The reply may include lines of text separated by CR and/or LF's within special tags that begin with <RFIDeasACP> and end with </RFIDeasACP>.

The 241 must be able to receive a 1024 character reply string.

All lines of text starting with "rfid:" will be sent to the reader. The 241 will wait for the serial prompt or delay for 100ms prior to sending the next line.

The command sleep (uint16_t ms) will inform the 241 to delay by ms milliseconds before sending the next command to the reader.

The 241 will strip leading and trailing white space from the command.

Valid reader commands may occur inside html comments.

Reader Command Example:

```
<html>
  <body>OK
    <!--
      <RFIDeasACP>
        rfid:beep.now=2
        sleep(500)
      </RFIDeasACP>
    -->
  </body>
```

</html>

```
init_serv_addr   = 0.0.0.0
init_serv_url    = http://www.rfideas241.com
init_serv_port   = 80
init_str         = /demo/init/init.php?csn=$1&mac=$2&luid=$3&seq=$4&ip=$5
init_retry_count = 10
init_retry_sleep = 2
init_short_beep  = 5
init_long_beep   = 2
data_serv_addr   = 0.0.0.0
data_serv_url    = http://www.rfideas241.com
data_serv_port   = 80
data_str         = /demo/data/put.php?csn=$1&mac=$2&luid=$3&seq=$4&ip=$5
data_retry_count = 10
data_retry_sleep = 2
data_short_beep  = 5
data_long_beep   = 2
```

Table 2 - Configuration Parameters

Parameter Name	Default	Parameter Range	Description
baud_rate	9600	9600, 57600	Serial port baud rate (bps)
char_size	8	8	Character width in bits
parity	None	None	Parity
flow_control	None	None	Flow Control
telnet_pot	23	0 through 65535 (inclusive)	Network to 241 Telnet port #
tunnel_port	2000	0 through 65535 (inclusive)	Network to Reader port #
ip_addr_mode	dhcp	dhcp, static	Address Mode
ip_addr	192.168.1.2	0.0.0.0 through 255.255.255.255 (inclusive)	Static IP Address
ip_mask	255.255.255.0	0.0.0.0 through 255.255.255.255 (inclusive)	Static IP Mask
gw_addr	0.0.0.0	0.0.0.0 through 255.255.255.255 (inclusive)	Static Gateway Address
dns1_addr	0.0.0.0	0.0.0.0 through 255.255.255.255 (inclusive)	Static DNS address
dns2_addr	0.0.0.0	0.0.0.0 through 255.255.255.255 (inclusive)	Static DNS address
eth0_mode	Auto-negotiate	10 Half Dup, 10Full Dup., 100 Full Dup, Auto	Ethernet (Network) Mode
eth1_mode	Auto-negotiate	10 Half Dup, 10Full Dup., 100 Full Dup, Auto	Ethernet (Device) Mode
location	""	40 ASCII Characters	Location string
serv_client	on	on, off	*on*, card data sent to server *off*, card data requested by client
ssl_enabled	No	No (default), Yes	SSL state
ssl_port	443 (HTTPS)	0 through 65355 (inclusive)	SSL port number
ssh_enabled	No	No (default), Yes	SSH state

Parameter Name	Default	Parameter Range	Description
ssh_port	22 (SSH)	0 through 65355 (inclusive)	SSH port number
init_serv_url	""	200 characters	URL of Reader initialization server
init_serv_port	80 (HTTP)	0 through 65535 (inclusive)	Reader initialization Server Port #
init_serv_str	""	200 characters	Reader initialization String
init_retry_count	10	0 through 255 (inclusive)	Retry limit if connection attempts fail
init_retry_sleep	2	1 through 255 (inclusive)	Interval between retries
init_long_beep	2	1-2 (beep.now = 101 | 102)	Long beeps if server init connect fails
init_short_beep	5	1-5 (beep.now = 1 | 2 | 3 | 4 | 5)	Short beeps if server init connect fails
data_serv_url	""	200 characters (inclusive)	URL with parameter string
data_serv_port	80 (HTTP)	0 through 65535 (inclusive)	Reader Data Server Port #
data_serv_str	""	200 characters	Reader Data String
data_retry_count	10	0 through 255 (inclusive)	Retry limit if connection attempts fail
data_retry_sleep	2	1 through 255 (inclusive)	Interval between retries
data_long_beep	2	1-2 (beep.now = 101 | 102)	Long beeps if server data connect fails
data_short_beep	5	1-5 (beep.now = 1 | 2 | 3 | 4 | 5)	Short beeps if server data connect fails
web_serv_port	80	0-65535	The port number of the 241 web server
password	""	20 characters	The telnet/tunnel/web password

Commands

4

Command Line

The command line is available to the serial port and via Telnet. It is designed to accommodate either human interaction or automated (scripted) operation. Character echo may optionally be disabled to support machine-to-machine communication.

```
RF IDeas{}>
```

Inside the curly braces may be optional flag characters that indicate current conditions. The letter 'T' would indicate that there is an active serial tunnel.

After a command is entered and processed, a response line will be printed and a new prompt will be presented:

```
nnn:TTT
RF IDeas{}>
```

The "nnn" preceding the colon will be a 3-digit response code. The "TTT" following the colon will be a mnemonic string. For example, the response line for a command that was completed successfully would be:

```
000:OK
```

Certain commands ('exit', and 'reboot') will print the response string before the command is processed. This is done because the command will close or alter the command line session.

Command lines are terminated by a newline (return key) character.

Echo

Syntax: **echo on|off**

This command provides control over whether or not characters will be echoed as they are entered at the command prompt. Normally, when a human is using the console, echo will be enabled. If an automated script is used to communicate with the command prompt, echo can be disabled.

Exit

Syntax: **exit**

This command will terminate the command line. The response message will be output before the exit operation is performed.

If the console was being accessed via the serial port, this command will cause the serial port to be

closed and tunneling will again be available to that port.

Exit -- (Continued)
If the console was being accessed via the Telnet server, this command will cause the Telnet TCP connection to be closed.

Factory_reset

Syntax: **factory_reset**

This command will reset all parameters to their factory default values per Table 2 and the Telnet password will be cleared.

Parameters may also be reset by holding the button closed for 5 seconds during power up.

Note: the system LED will turn red and then green, at which point the button can then be released

Password

Syntax: **password**

This command will set the Telnet password. This command will prompt twice for the password to be echoed. The password will not be displayed as it is typed. If the password is entered the same way twice, the change will be stored. Entering an empty line at the two prompts will clear the password.

Reboot

Syntax: **reboot**

This command causes the Ethernet 241 to reboot.

Upon receipt of this command, the Ethernet 241 will output the response message "001:REBOOT", wait 250 milliseconds and then perform the reboot operation. If this command is sent via the Telnet interface, the Telnet connection will be closed before the reboot is performed.

Set

Syntax: **set <name> <value>**

This command will change the value of a parameter where 'name' identifies the parameter to be changed and 'value' must be a valid value for that parameter as given in Table 2.

Changes to parameters will take effect on the next reboot of the Ethernet 241.

Show

Syntax: **show <name>|all**

This command will display the value for a specified parameter or if the "all" keyword is given it will

display a list of parameter names and the value for each.

Version

Syntax: **version**

This command causes the version of Ethernet 241 software to be displayed. The version number will of the form x.yy where "x" is the major version and "yy" is the minor version (00-99).

Examples

The Ethernet 241 (Ethernet 241 for RF IDeas serial reader) accepts Telnet connects on two ports: 23 and 2000.

- Port 23 allows you to setup the Ethernet 241 operation.
- Port 2000 provides a tunnel port that passes serial data thru to the RF IDeas pcProx Plus serial reader. Port 2000 will not accept connections while 23 is active so before disconnecting from port 23 make sure you type 'exit' to close the shell.

For this example, Ethernet 241 has an IP address: 10.10.10.87. Note, yours may be different.

Below we will turn off the echo in the shell.

Note: BOLD Signifies what is sent/typed

Commands Example 1:

Set up for use with echoes disabled and connect the 241.

1. Telnet into 10.10.10.87 23
   Open a CMD.exe shell
   Telnet 10.10.10.87 23
   RFIDeas 241, enable echo [Y|N]>**Y**

2. RF IDeas{}>**echo off**
   RF IDeas{}>**exit**

3. Connect AK5 reader to DB-9

4. Telnet into port 2000
   Telnet 10.10.10.87 2000

5. *Since Microsoft Telnet echos too, turn off echo on Reader with rfid:cmd.echo=0*
   Type: **rfid:cmd.echo=0** *which appears as...*
   RF IDeas>rrffiidd::ccmmdd..eecchhoo==00

Commands Example 2:

Show all card technologies available.

RF IDeas>**rfid:cfg.card.list**

0x0000 --- OFF ---
0x7F31 Advant CSN (Legic)
0xFA02 Awid : RDR-698x Compatible
0xF602 Cardax UID : RDR-6C8x Compatible
0xFC02 CASI-RUSCO (GE Security, UTC) : RDR-628x Compatible
0xE912 CDVI
0xF401 Deister UID
0x7F01 DESFire CSN
0xFB11 DIGITAG
0xF101 Dimpna UID
0xFB01 EM 410x : RDR-6E8x Compatible
0xFB02 EM 410x Alternate
0x7E31 etag CSN (Secura Key)
0xEA22 Farpointe Data (Pyramid) PSC-1 26 Bit : RDR-647x Compatible
0xEA21 Farpointe Data (Pyramid) UID
0xF502 GProx-II UID : RDR-6G8x Compatible
0x7D01 HID iCLASS CSN
*0xEF04 HID Prox : RDR-608x Compatible
0xEF01 HID Prox UID
0xF302 HiTag 1 & S : RDR-6H8x Compatible
0xF304 HiTag 1 & S Alternate
0xF201 HiTag 2 : RDR-6H8x Compatible
0xF204 HiTag 2 Alternate
0x7E01 I-Code CSN (Philips, NXP)
0x7F11 I-tag CSN (IBM)
0xFD02 Indala ASP 26 bit (Motorola) : RDR-638x Compatible
0xFD01 Indala ASP UID (Motorola)
0xFD04 Indala ASP Custom : Please contact RF IDeas sales
0xED02 Indala ASP+ UID (Motorola)
0xED05 Indala ASP+ Custom : Please contact RF IDeas sales
0xFD05 Indala ECR Custom : Please contact RF IDeas sales
0xF902 ioProx (Kantech) : RDR-678x Compatible
0x7F21 ISO 14443A CSN
0x7E21 ISO 15693 CSN
0xEA01 Keri NXT UID
0xEA02 Keri PSC-1 26 Bit
0xF802 Keri UID : RDR-6K8x Compatible
0x7F41 MiFare CSN (Philips, NXP)
0x7F51 MiFare Ultralight CSN (Philips, NXP)
0x7E11 my-d CSN (Infineon)
0xF722 NexKey, Quadrakey, KeyMate, 2Smart Key (Honeywell)
0xF712 Nexwatch (Honeywell) : RDR 6N8x Compatible
0xE902 Paradox
0xEA12 Pyramid (Farpointe Data) PSC-1 26 Bit
0xEA11 Pyramid (Farpointe Data) UID
0xEB02 Radio Key (Secura Key -02) RKCx-02 : RDR-6Z8x Compatible
0x6F01 RDR-758x Equivalent
0xF004 ReadyKey Pro UID : RDR-6R8x Compatible
0xFB21 Rosslare
0xF612 Russwin UID
0xEC01 Secura Key -01 RKCx-01
0x7E41 Tag-It CSN (Texas Instruments)

RF IDeas>

Commands Example 3:

Here we show you how to set two different card technologies in the pcProx Plus reader. To set configuration #1 to Paradox and configuration #2 to Tagit

RF IDeas>rfid:cfg=1
RF IDeas>rfid:cfg.card.type=0xe902
RF IDeas>rfid:cfg=2
RF IDeas>rfid:cfg.card.type=0x7E41

RF IDeas>rfid:cfg.write

{OK}
RF IDeas>

Command Response Messages

Once a command is processed, the command processor will print a status reply, a carriage-return and newline and a new prompt. The status reply will be a 3-digit status code followed by a colon and a mnemonic for the status. The number is provided so that an automated script may easily parse the result of a command. The mnemonic is provided for human interaction.

Response codes in the range 000-099 indicate success with possible additional conditions such as rebooting. Response codes in the range 100-999 indicate error conditions. Table 2 lists the defined status messages.

Table 3: Status Messages

Status Message	Meaning
000: OK	Command processed successfully
001: REBOOT	The device is rebooting. The host system must wait several seconds before attempting to communicate again with the device.
002: CLOSED	The Telnet session has been closed. There will not be a command prompt after this message.
100:CMD-BAD	Command not understood
101: PARAM-BAD	The parameter name for the set / show commands does not match one accepted by this device.
102: PARAM-VAL	The value specified for the selected parameter is out of range.
106: SYS-ERR	An internal error occurred while processing the command.
107: TIMEOUT	No command was typed with the 30 second time limit.

Additional Device Features

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LED indicators

The Ethernet 241 provides the following LED indicators.

- System Status. This is a bi-color (Red/Green) LED that indicates the current status of the Ethernet 241. The LED will be green when the Ethernet 241 is operating normally and red if there is an error condition.
- Ethernet link/activity. Each Ethernet port has a green LED that indicates the presence of Ethernet link, the speed of the link and whether there is activity:

  OFF = no link

  ON = link present

  The LED will flash in the presence of activity or remain solid in the absence of activity.
- Serial RX/TX. This is a green/yellow LED that will flash green when data is being received from the badge reader and flash yellow when data is being transmitted to the badge reader.

Button

The Ethernet 241 has a recessed button that provides two functions:

- When the button is pressed momentarily and released the command line will be presented at the serial port. If there was a tunnel session in progress at the time, it will be forced closed. If a valid command is not entered at the command prompt within 30 seconds, the command prompt will be canceled and the serial port will again be available for tunneling.
- When the button is held for 5 seconds during power up (Note: the system LED will turn red and then green, at which point the button can then be released), parameters will be reset to their factory values and the Ethernet 241 will reboot.

Discovery

The Ethernet 241 provides a Discovery server. This is a process that listens at UDP port 11000 for a Discovery Request message. When a message of this format is received, the server will send back to the requesting IP address and port number a response message that identifies the Ethernet 241 and provides information about its current state.

A host system is required having software that will broadcast the Discovery Request message and collect, interpret and display information about the responding Ethernet 241 devices on the network.

Network – Discovery

The 241 will listen on a UDP socket at the Discovery port, 11000, for a Discovery Request packet. The 241 will respond with a Discovery Reply packet identifying itself to a host system on the network.

The Discovery Request message will conform to the following:

Table 4: Discovery Request

Byte Offset	Length	Description
0	8	'RFIDDISC'
8	1	1 (Message Type 1= Discovery Request)
9	1	0 (Reserved – Future)

The Discovery Response message is sent in response to the Discovery Request message and will conform to the following format:

Table 5: Discovery Response

Byte Offset	Length	Description
0	8	'RFIDDISC'
8	1	2 (Message Type 2= Discovery Reply)
9	1	1 (Discovery Response Version v2.41)
10	4	0xF4 0xF0 0xF2 0xF0
14	14	'-RFIDeas/Wedge '
28	1	0x0
29	6	Network port MAC address
35	1	Pad (0)
36	4	Network port IP Address
40	4	Net mask
44	4	Gateway Address
48	40	Null terminated location string
88	4	Device Status bit mask (see see REQ010.2.3)
92	4	Telnet connection IP address
96	2	Tunnel connection remote port
98	4	Tunnel Connection IP address
102	2	Tunnel connection remote port
104	6	Device port MAC address
110	4	Device IP address
114	14	Reserved (0)

The Discovery Response Device Status bit mask will conform to the following format:

Table 6: Discovery Response Device Status

Bit Offset	Description
1:0	Network Port Status 0=link down 01=link up 10 Mbps half duplex 10=link up 10 Mbps full duplex 11=link up 100 Mbps full duplex
3:2	Printer port status 0 = link down 01 = link up 10 Mbps half duplex 10 = link up 10 Mbps full duplex 11 = link up 100 Mbps full duplex
4	Tunnel status 0 = idle 1 = active
5	Telnet status 0 = idle 1 = active
6	Reserved (0)
7	Reserved (0)
11:8	Software status 0 = normal operation 1 = corrupted configuration 2-15 = Reserved
31:12	Reserved (0)

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